Remarks:

Reconsideration of the application, as amended herein, is respectfully requested.

Claims 2, 4, 10, 12, 14 - 16 and 24 are presently pending in the application. Claim 1 has been canceled. Claims 3, 5 - 9, 11, 13 and 17 - 23 were previously canceled. Claims 2, 4, 10, 14 and 16 have been amended. New claim 24 has been added.

In item 1 of the above-identified Office Action, claims 1 - 2, 4, 10, 12 and 14 - 16 were rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by U. S. Patent No. 6,177,351 to Beratan et al. ("**BERATAN**").

Applicants respectfully traverse the above rejections, as applied to the amended claims.

More particularly, claim 1 has been replaced by new claim 24, which recites, among other limitations:

> a base substrate at least partially composed of an insulating material and formed with at least one opening;
>
> **a metal silicide layer disposed on said base substrate in said opening;**
>
> **an adhesion layer disposed on said base substrate above and outside of said opening in direct contact with said metal silicide layer**, said adhesion layer

> containing at least one material selected from the group consisting of zirconium, hafnium, cerium, vanadium, chromium, and niobium;
>
> a barrier layer including an oxygen-containing iridium layer and an oxygen barrier layer, said oxygen barrier layer being composed of one of iridium dioxide and ruthenium dioxide; and
>
> **at least one layer of said barrier layer being provided over said adhesion layer and in direct contact with said adhesion layer**, such that at least a portion of said adhesion layer is located directly between said metal silicide layer disposed in said opening and said at least one layer of said barrier layer, **thus forming a layer stack of said metal silicide layer, said adhesion layer and said at least one layer of said barrier layer.** [emphasis added by Applicants]

As such, Applicants' new claim 24 requires, among other limitations: 1) a metal silicide layer formed in an opening of the base substrate; 2) a particularly recited adhesion layer disposed on the base substrate above and outside of the opening in direct contact with the metal silicide layer formed in the opening; 3) a particularly recited barrier layer provided over, and in direct contact with, the adhesion layer of 2); and 4) that the **metal silicide layer in the opening, the adhesion layer outside and above the opening, and the portion of the barrier layer formed over the adhesion layer, form a layer stack, in that particular relative order**.

New claim 24 is supported by the specification of the instant application, for example, by former claim 1, by originally

filed Fig. 1, and by paragraphs [0076] and [0078] of the published version of the instant application.

In contrast to Applicants' claimed invention, the **BERATAN** reference fails to teach or suggest, among other limitations of Applicants' claims, **a layer stack of a metal silicide layer formed in the opening, which is in direct contact with a particularly formulated adhesion layer outside and above the opening, which adhesion layer is in direct contact with a portion of a particularly formulated barrier layer formed over the adhesion layer.**

The **BERATAN** reference, cited in the Office Action against Applicants' former claim 1, does not teach or suggest Applicants' particularly claimed invention of claim 24. This failure of **BERATAN** can be seen, more particularly, in connection with Fig. 3 of **BERATAN**, pointed to in the rejection of former claim 1 in item 3 of the Office Action, which is being reproduced herebelow for convenience.

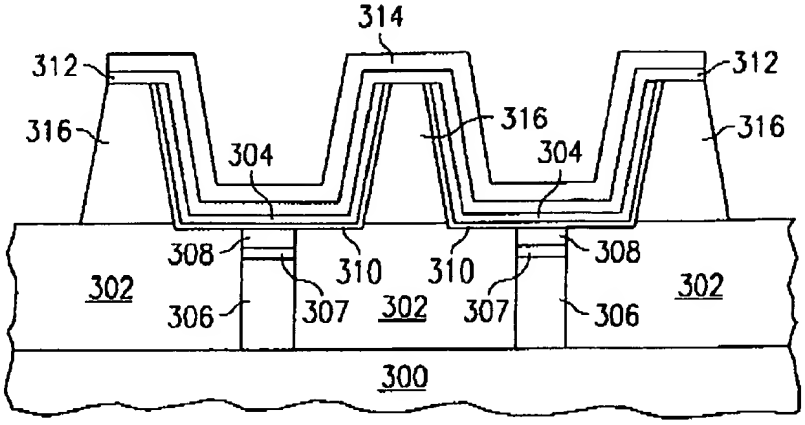


FIG. 3

With regard to Fig. 3, col. 6 of **BERATAN**, lines 30 - 46, state:

> Adhesion-promoting layer 310 lines the trenches to ensure that bottom electrode 304 is not removed in subsequent process steps, but layer 310 is discontinuous between the capacitors to maintain electrical isolation of the bottom electrodes 304. Bottom electrodes 304 are thinner than in the embodiment shown in FIG. 2. The thickness ranges from approximately 10 nm to 50 nm and is preferably about 20 nm. The structure of FIG. 3 is otherwise similar to that shown in FIG. 2 and comprises interlayer dielectric 302 formed on substrate 300. **The bottom electrode 304 makes contact with the substrate 300 through the conductive adhesion-promoting layer 310, the oxidation barrier 308, the silicide layer 307, and the plug 306**. Bottom electrode 304 is covered with capacitor dielectric 312 and in turn by top electrode 314. Refer to the first preferred embodiment above for material choices and alternatives. [emphasis added by Applicants]

As such, in connection with Fig. 3, **BERATAN** discloses a trench (not numbered) in a dielectric layer 302 of **BERATAN**, having an **oxidation barrier 308, a silicide layer 307, and a plug 306**

located therein, in that order. Additionally, **BERATAN** discloses an adhesion promoting layer 310 disposed above and outside the trench, **in contact with the oxidation barrier 308.** As such, the layer stack in **BERATAN** is formed by a silicide layer 307 in the trench, **an oxidation barrier 308 located in the trench above the silicide layer 307, and an adhesive promoting layer 310, in direct contact with the oxidation barrier 308 of BERATAN**, but **not** in direct contact with a metal silicide layer located in the trench of **BERATAN**, as required by Applicants' claims. In other words, in the embodiment of Fig. 3 of **BERATAN**, the silicide layer 307 is in the trench opening, but is **separated from** (i.e., **not** in **direct** contact with) the adhesion-promoting layer 310 of **BERATAN** by the oxidation barrier 308 of **BERATAN**. Additionally, it can be seen from the foregoing that the adhesion-promoting layer 310 of **BERATAN** is located **above** the oxidation barrier 308 of **BERATAN**, and vice-versa, as required by Applicants' claims.

Note that, the oxidation barrier 308 of Fig. 3 of **BERATAN** cannot be considered part of the silicide layer 307 of **BERATAN**. More particularly, col. 4 of **BERATAN**, lines 43 - 60, discloses the possible materials for the oxidation barrier of that reference, stating:

> Barrier layer 208 is preferably Ti--Al--N in which the composition ranges between Ti--N and $(Ti_{0.5}\ Al_{0.5})$--N, and is preferably $(Ti._{0.75}\ Al_{0.25})$--N. The thickness of

> the barrier may range between 10 nm and 100 nm, but the preferred range is between 20 and 50 nm. Examples of alternative barrier materials include the following: Ta--N, Ta--Al--N, Ti--Si--N, W--Si--N, Ru--N, W--N, Ru--Al--N, Ru--Si--N, Cr--N, Cr--Al--N, Mo--N, Mo--Al--N, Mo--Si--N, V--N, V--Si--N, V--Al--N, Hf--N, Hf--Al--N, ternary (or greater) nitrides (such as Ta--Si--N, Ta--B--N, Ti--B--N), Zr--N, Y--N, Sc--N, La--N, nitrogen deficient Al--N, doped Al--N, Mg--N, Ca--N, Sr--N, Ba--N, alloys of the above. Additional alternative barrier materials include noble-metal-insulator alloys such as Pt--Si--N, Pd--Si--O, Pd--Si--O, Pd--B--(O,N), Pd--Al--N, Ru--Si--(O,N), Ir--Si--O, Re--Si--N, Rh--Al--O, Au--Si--N, and Ag--Si--N.

None of the possible barrier layer materials listed in col. 4 of **BERATAN**, lines 43 - 60, is a metal silicide. As such, **BERATAN** does not teach or suggest, among other things, that the oxidation barrier 308 is a metal silicide. Further, **BERATAN** specifically **teaches away from** oxidation barrier 308 being a metal silicide. More particularly, col. 4 of **BERATAN**, lines 60 - 65, state:

> Note that the barrier layer may comprise multiple layers of different materials or combinations of the above materials. **Conductive plug 206 and barrier layer 208 may be separated by a silicide layer 207, such as $TiSi_2$.** [emphasis added]

It would be ridiculous for **BERATAN** to make the statement that "**[c]onductive plug 206 and barrier layer 208 may be separated by a silicide layer 207, such as $TiSi_2$**" if the barrier layer 208 of **BERATAN** was, itself, a metal silicide layer.

As such, the metal silicide layer 307 of **BERATAN**, located in the trench in the materials 302 of **BERATAN**, is **not** in direct contact with the adhesive layer (310 of Fig. 3 of **BERATAN**), as required by Applicants' claims, but rather, they are separated by the oxidation barrier 308 of Fig. 3 of **BERATAN**.

Similarly, Fig. 4 of **BERATAN** shows an embodiment described as being similar to that of Fig. 3 of **BERATAN**, except that the oxidation barrier 408 is not recessed in the trench. However, in the embodiment of Fig. 4 of **BERATAN**, the adhesion-promoting layer 410 of **BERATAN** is still separated from (i.e., **not** in **direct** contact with) the metal silicide layer 407 of Fig. 4 of **BERATAN** by an oxidation barrier 408. Note that, the oxidation barrier 408 of Fig. 4 of **BERATAN** cannot be considered part of the adhesion-promoting layer 410 of **BERATAN**, as **BERATAN** discloses them as two layers 408, 410 serving different purposes. More particularly, **BERATAN** discloses including an oxidation barrier 408 to prevent silicon dioxide from forming and reducing the conductivity of the plug/barrier /electrode combination. This can be seen from col. 3 of **BERATAN**, lines 57 - 65, which state:

> Reaction/oxidation barrier 108 is placed between the electrode, which is typically composed of platinum, and the plug, which is typically composed of polysilicon. **In the absence of barrier 108, platinum silicide would form at temperatures around 400° C. between the platinum electrode and polysilicon plug. In the presence of oxygen, an insulator, silicon**

> **dioxide, would form from the platinum silicide and the conductivity of the plug/barrier/electrode combination would suffer.** [emphasis added by Applicants]

As such, **BERATAN** teaches the inclusion of the reaction/oxidation barrier 408 of Fig. 4 to serve as a reaction barrier against oxidation. **BERATAN** does not teach or suggest that the oxidation barrier 408 of **BERATAN** serves as an adhesion-promoting layer, nor does the oxidation barrier 408 of Fig. 4 of **BERATAN**, in fact, serve as an adhesion-promoting layer. That is why **BERATAN** specifically teaches the inclusion oxidation barrier 408 of Fig. 4 of **BERATAN** **in addition to** the adhesion-promoting layer 410 of Fig. 4 of **BERATAN.**

As can be seen from the foregoing, both embodiments of Figs. 3 and 4 of **BERATAN** fail to teach or suggest, among other limitations of Applicants' claims, an adhesion layer **in direct contact with** a metal silicide layer **disposed in the opening**, and **a barrier layer over and in direct contact with the adhesion layer**, as required by Applicants' claims. As discussed above, in **BERATAN**, the barrier layer 308, 408 of Figs. 3 and 4, respectively, intervenes.

Further, even using the interpretation of the device of **BERATAN** made in the Office Action, the **BERATAN** reference fails to teach or suggest Applicants' presently claimed invention. More particularly, page 2 of the Office Action pointed to the

bottom electrode "304" of **BERATAN**, as allegedly forming a "barrier layer" as claimed in Applicants' former claim 1. In doing so, page 4 of the Office Action stated, in part:

> The applicant states that the bottom electrode 304 of BERATAN is not an oxygen-containing barrier layer. **The examiner takes the position that there is no structural difference between a "barrier layer" or a "bottom electrode layer"**. They both are, structurally, layers of conductive oxide Ir02/ RuO. The conductive oxide Ir02/ RuO layers are labeled as a "barrier layer" or "bottom electrode layer" depending on how the device is intended to be used. **The manner in which the claim is written does not structurally define a "barrier layer" that is distinguishable from any other conductive oxide layers taught by BERATAN**. Regarding the recitation of "barrier layer", the manner of operating the device does not differentiate an apparatus claim from the prior art. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987) See MPEP §2114. The recitation of "barrier layer" is an intended use language which does not differentiate the claimed device from the prior art device of BERATAN, who teaches the conductive oxide layers of the claim as described above. [emphasis added by Applicants]

However, even assuming, arguendo, that the bottom electrode 304 of **BERATAN** were to be considered "a barrier layer", this interpretation would **not** cause **BERATAN** to read on Applicants' claimed invention. More particularly, the bottom electrode 304 of **BERATAN** is located above the adhesion-promoting layer 310 of **BERATAN**, which adhesion-promoting layer 310 of **BERATAN** is **not** in direct contact with the metal silicide layer (307,

407 of **BERATAN**) located in the trench, but is separated therefrom by the oxidation barrier layer 308, 408 of **BERATAN**.

Further, page 3 of the Office Action alleged, in part, that the adhesion-promoting layer 310 of **BERATAN** was analogous to **both** Applicants' particularly claimed adhesive layer and Applicants' particularly claimed metal silicide layer. Applicants respectfully disagree.

First, page 3 of the Office Action cited col. 5 of **BERATAN**, lines 22 - 38 as support for allegedly showing that the adhesion promoting layer 310 of **BERATAN** was a metal silicide layer. However, **none** of the materials listed in col. 5 of **BERATAN**, lines 22 - 38, are metal silicides. Rather, col. 5 of **BERATAN**, lines 22 - 38, state:

> Examples of alternative materials for the adhesion-promoting layer include the following: Ta--Al--N, Ti--Si--N, W--Si--N, W--N, W--Si--N, Cr--N, Cr--Al--N, Mo--N, Mo--Al--N, Mo--Si--N, Si--N, Si, Ge, V, V--N, V--Si--N, V--Al--N, Ti--Si, Ta--Si, W--Si, Mo--Si, Cr--Si, Pt--Si, W, Ta, Ti, Sn, Ru, In, Os, Rh, Ir, ternary (or greater) nitrides (such as TaSi--N, Ta--B--N, Ti--B--N), Zr--N, Y--N, Sc--N, La--N, nitrogen deficient Al--N, doped Al--N, Mg--N, Ca--N, Sr--N, Ba--N, and alloys of the above. Additional alternative adhesion-promoting materials include noble-metal-insulator alloys such as Pt--Si--N, Pd--Si--O, Pd--Si--O, Pd--B--(O,N), Pd--Al--N, Ru--Si--(O,N), Ir--Si--O, Re--Si--N, Rh--Al--O, Au--Si--N, and Ag--Si--N.

As such, the adhesion-promoting layer 310 of **BERATAN**, contrary to the statement made in the Office Action, is not a metal silicide. In the event that the next Office Action continues to assert that the adhesion-promoting layer 310 of **BERATAN** is a metal silicide, Applicants respectfully request clarification as to which compound in the cited portion of **BERATAN** is alleged to be a metal silicide.

However, even if the adhesion-promoting layer 310 of **BERATAN** were alleged to be, arguendo, a metal silicide layer, it still would not constitute the metal silicide layer of Applicants' claimed invention. Rather, Applicants' claimed invention requires a metal silicide layer **located in the opening**, and in direct contact **with an adhesive layer disposed outside** and above the opening. The adhesion-promoting layer 310 is located **outside of** the trench of the **BERATON** reference, but does not extend into it. See, for example, Fig. 3 of **BERATAN**. As such, the adhesion-promoting layer 310 cannot constitute the metal silicide layer "in the opening" of Applicants' claimed invention. Additionally, Applicants additionally disagree that the adhesion-promoting layer 310 of **BERATAN** can be analogized to **two** fundamentally different elements of Applicants' claimed layer stack.

For the foregoing reasons, among others, Applicants' claims are believed to be patentable over the **BERATAN** reference.

It is accordingly believed that none of the references, whether taken alone or in any combination, teach or suggest the features of claim 1. Claim 1 is, therefore, believed to be patentable over the art. The dependent claims are believed to be patentable as well because they all are ultimately dependent on claim 1.

In view of the foregoing, reconsideration and allowance of claims 1 - 2, 4, 10, 12 and 14 - 16 are solicited.

In the event the Examiner should still find any of the claims to be unpatentable, counsel would appreciate receiving a telephone call so that, if possible, patentable language can be worked out. In the alternative, the entry of the amendment is requested, as it is believed to place the application in better condition for appeal, without requiring extension of the field of search.

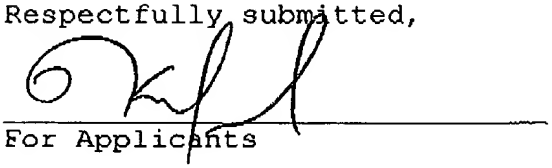
The instant amendment is being filed simultaneously with a Request for Continued Examination (RCE) and its associated fee. Additionally, please consider the present as a petition for a one (1) month extension of time, and please provide a

one (1) month extension of time, to and including, September 15, 2008, to respond to the present Office Action.

The extension fee for response within a period of one (1) month pursuant to Section 1.136(a) in the amount of $120.00 in accordance with Section 1.17 is enclosed herewith.

Please provide any additional extensions of time that may be necessary and charge any other fees that might be due with respect to Sections 1.16 and 1.17 to the Deposit Account of Lerner Greenberg Stemer LLP, No. 12-1099.

Respectfully submitted,



Kerry P. Sisselman
Reg. No. 37,237

For Applicants

September 15, 2008

Lerner Greenberg Stemer LLP
Post Office Box 2480
Hollywood, FL 33022-2480
Tel: (954) 925-1100
Fax: (954) 925-1101